

CHAPTER 8

HAIL

Hail causes more than a billion dollars of property damage nationally each year, mostly to crops. The southeast corner of Wyoming lies within the nations “Hail Alley.” Together with adjacent portions of Colorado and Nebraska, this region of Wyoming is battered by more hailstorms than any other part of the United States. Climatological data shows this area of Wyoming averaging five to nine days annually when hail is reported. While Crook County is not in “Hail Alley,” damaging hail storm have still occurred.

History

NOAA defines “damaging hail” as that which has hailstones of 1 inch or more in diameter. NCDC recorded 274 damaging hail storms in Crook since 1940. Thus, there is a 100% probability that a damaging hailstorm will occur in Crook County in any given year. Highlights from the history are below. Table 8.1 presents a partial history of damaging hail storms. 42 events that explicitly caused damage are included in Table 8.1. The data were derived from the monthly Storm Data reports generated and released by NCDC. Other sources are unpublished reports from the Wyoming Office of Homeland Security, newspaper accounts, and periodicals from public libraries. The table represents hail storms that have caused damage, injuries, or loss of life. Some excerpts from the table follow that describe some of the damage typical to a hail event in the county.

On September 11, 1980 golf ball-sized hail, 2 to 5 inches deep in places, devastated the Moorcroft area in about 20 minutes. Schools, dwellings, businesses and automobiles suffered great damages. Trees were stripped and gardens were destroyed. Damage was estimated at \$2,750,000 in 1980 dollars and \$7.7 million in 2012 dollars.

A severe thunderstorm swept through north central Crook County on August 11, 1987. This storm produced heavy rain and hail from one-quarter of an inch to two inches in diameter near Hulett. Wyoming Highway 24 south of Hulett was closed for a short time due to one- to two-foot drifts of hail and minor flooding as more than two inches of rain fell in about 30 minutes. Ranchers south of Hulett reported numerous windows shattered and roof and siding damage due to hail. Ranchers north of Aladdin reported washed out fences and the loss of livestock. Grain crops were battered flat by the hailstorm from Alva to Aladdin. The hail one mile west of Alva drifted to a depth from 4 inches to over 12 inches. Damage was estimated at \$27,500 in 1987 dollars and \$55,997 in 2012 dollars.

Table 8.1 Damaging Hail Storms: 1940-2012

County	Location	Start Date	Deaths	Injured	Estimated Damage-Property	Estimated Damage-Crops	Character of Storm	Information
Crook	Sundance	22-Jun-1940					Hail	Damaging hail storms were reported from parts of Crook, Weston, and Campbell Counties on the 3 rd , 5 th , and 22 nd . Slight damage occurred to crops in the northeast portion of the State.
Crook	Colony	25-Jul-1940						A damaging hail storm was reported from Crook County on the 25 th . Gardens and field crops were seriously damaged during this storm.
Crook		24-May-1941						The heaviest hail storms were those that occurred in Crook County on the 27 th and in the lower Big Horn Basin near the Montana line on the 30 th . This latter storm resulted in considerable damage to crops both by hail and floodwaters, as well as damage to bridges.
Crook		10-Jun-1946				\$50,000		A storm in Crook County on the 10 th and 11 th caused approximately \$50,000 in damages to growing crops, as well as some damage to roofs and windows.
Crook	Northeast portion of the State	18-Jun-1951			\$40,000			A series of hail storms over the northeast portion of the State on the 18 th caused about \$40,000 in damages. While some damage occurred to growing crops, the principal damage was to buildings and automobiles.
Crook	Northeast corner	5-Aug-1953			\$5,000	\$20,000		The extreme northeast corner was hit by a hailstorm on the 5 th that caused \$20,000 in damages to crops and \$5,000 in property damages.
Crook	Sundance	15-July-1956			\$750	\$50,000		On the 15 th in an area 15 to 25 miles south of Sundance, a hail and windstorm occurred causing \$1,500 in property damage, 50% attributed to hail, and \$50,000 in crop damage, 90% attributed to hail.
Crook	Sundance	6-Aug-1956	0	0	\$0	\$0	Hail (3.00)	At Sundance, 4:30pm on the 6 th , a thunderstorm with hail passed southeastward. Heavy damage was caused over an area about one mile wide and two miles long. Some hail was as large as tennis balls.
Crook	Alva	14-Jul-1957						Near Alva during the afternoon of the 14 th , hail caused fairly heavy damage to crops.
Crook	South of Sundance, Miller Creek	24-Jun-1959			\$2,750	\$27,500	Rain and Hail (4.00); Flood, flash	Storm moved down Miller Creek with hail stones to 4 inches in diameter. Some flash flooding from heavy rain.
Crook	Southwest of Sundance	25-Jun-1959			\$2,750	\$27,500	Tornado, hail and rain	Severe thunderstorm moving north to northwest down Kara creek with heavy rain and hail causing some damage. Tornado developed with storm for a brief period causing most of the reported property damage at one ranch.

Table 8.1 Damaging Hail Storms: 1940-2012

County	Location	Start Date	Deaths	Injured	Estimated Damage-Property	Estimated Damage-Crops	Character of Storm	Information
Crook	Moorcroft 15 S	11-Jun-1962	0	0	\$0	\$2,750	Tornado, hail and 2 funnels aloft	Tornado and two funnels observed but details of path not. Most damage was done by hail to grasslands.
Crook	Moorcroft 6 N	12-Jul-1965	0	0	\$27,500	\$0	Hail (1.50)	Hail 1.5 inches in diameter destroyed crops and forage over about 15 square miles. Homes and trees were also damaged.
Campbell, Weston and Crook	Northeast Wyoming	20-Jun-1968	0	0	\$275,000	\$0	Hail (3.00)	Severe hailstorms with some hail in the Hulett area up to 3 inches diameter did damage to cars, buildings, utilities, and crops in the northern Campbell County, Weston County, and Crook County area.
Crook	Moorcroft 10 W	16-Jun-1977	0	0	\$27,500	\$0	Hail (1.00)	Hail up to 1 inch in diameter, 4 to 6 inches deep caused damage to crops, houses, cars, etc.
Crook	Moorcroft area	11-Sep-1980	0	0	\$2,750,000	\$0	Hail (3.00)	Golf ball-sized hail, 2 to 5 inches deep in places, devastated the Moorcroft area in about 20 minutes. Schools, dwellings, businesses and automobiles suffered great damages. Trees were stripped and gardens were destroyed.
Crook	Oshoto, Sundance, Moskee	13-Jun-1982	0	0	?	?	Heavy Rain; Hail (1.00); Flood	A thunderstorm dumped up to 7 inches of rain throughout the southeastern part of Crook County along with hail drifts from 2 to 5 feet in some places. The hail ranged from pea-sized up to 1.0 inch in diameter and caused considerable damage. Losses included fences, corrals, water tanks, soil and stock. The major damage in the Moskee and Oshoto areas was due to flooding.
Crook	Sundance	23-Aug-1982	0	0	\$27,500	\$2,750	Hail	A destructive hailstorm caused severe damage to crops, buildings, and vehicles in rural areas west and south of Sundance. The size of the hail stones was not reported.
Sheridan, Campbell, Crook, and Weston	Northeast Wyoming	13-Jun-1984	0	0	\$2,750	\$0	Winds, hail	Strong thunderstorms scattered throughout northeast Wyoming produced widespread minor damage to ranch outbuildings and mobile homes as marble-sized hail and winds up to 50 MPH struck the area. Some hail as large as golf balls fell near Ranchester, 20 miles northwest of Sheridan. Winds were also reported to be near 60 MPH in the Upton and Sundance areas.

Table 8.1 Damaging Hail Storms: 1940-2012

County	Location	Start Date	Deaths	Injured	Estimated Damage-Property	Estimated Damage-Crops	Character of Storm	Information
Washakie, Natrona, and Crook	North-central and northeast Wyoming	6-Sep-1984	0	0	\$27,500	\$27,500	Hail	Wind gusts to 61 MPH were logged at Worland Airport in Washakie County. They occurred as a strong cold front moved through early in the afternoon. A double-wide trailer was tipped over. Slight crop damage also occurred. Later in the afternoon, roof damage in Natrona county and tree and building damage in Crook County was reported.
Crook	2S Hulett 1W Alva	11-Aug-1987	0	0	\$27,500	\$27,500	Hail (2.00)	A severe thunderstorm swept through north central Crook County after 1715 MST. This storm produced heavy rain and hail from 0.25 to 2.0 inches in diameter near Hulett. Wyoming Highway 24 south of Hulett was closed for a short time due to 1- to 2-foot drifts of hail and minor flooding as more than 2 inches of rain fell in about 30 minutes. Ranchers south of Hulett reported numerous windows shattered and roof and siding damage due to hail. Ranchers north of Aladdin reported washed out fences and the loss of livestock. Grain crops were battered flat by the hailstorm from Alva to Aladdin. The hail one mile west of Alva drifted to a depth from 4 inches to over 12 inches. NCDC recorded this incident at two separate events near Hulett and Alva.
Crook	10 SW Moorcroft	16-Jun-1989	0	0	\$2,750	\$0	Hail (1.5)	
Crook	Moorcroft	11-Aug-1999	0	0	\$20,000		Hail (1.75)	Eighty houses had hail damage---mostly broken windows and damaged siding. Two police vehicles had moderate hail damage and another was totaled by hail.
Crook	18 NW New Haven	4-Jul-2000	0	0	\$10,000		Hail (2.75)	Several windows were broken. Also several cattle and antelope were killed.
Crook	Devils Tower 3 SE Devils Tower New Haven	8-Jul-2001	0	4	\$10,000		Hail (2.50)	A thunderstorm moved across Crook County producing very large hail. Hail ranging in size from pennies to tennis balls pelted Devil's Tower for 40 minutes. Four injuries (direct) were climbers on Devil's Tower who were hit by hail. Two injuries (direct) were the result of a lightning strike. The injuries were not life threatening, and it is not known if medical attention was administered. Damage to several cars was reported as "significant." NCDC recorded this incident as three separate events in Devils Tower, 3 miles SE of Devils Tower, and in New Haven.
Crook	Sundance	16-Jun-2007			\$96,900		Hail (1.00)	

Table 8.1 Damaging Hail Storms: 1940-2012

County	Location	Start Date	Deaths	Injured	Estimated Damage-Property	Estimated Damage-Crops	Character of Storm	Information
Crook	4 W New Haven Colony 1 SW Lightning Flat 2 SW Lightning Flat 16 N Hulett Aladdin 20 NW Aladdin	25-Jun-2007			\$48,450		Hail (0.75-4.25)	Hail damaged automobiles. Severe thunderstorms moved across northern Campbell and Crook Counties during the late afternoon and evening. A long-lived supercell thunderstorm produced hail to softball size, causing damage. NCDC recorded this incident as seven separate events based on location.
Crook	11 S Hulett	18-Jul-2007	0	0	\$5,000	\$0	Hail (2.50)	Severe thunderstorms produced large hail and strong wind gusts across parts of Crook and Weston Counties during the early evening hours.
Crook	19 SW Upton	2-Jun-2008			\$10,070			A severe thunderstorm produced large hail near Lightning Flat.
Crook	3 SSW Lightning Flat	16-Jun-2008			\$10,070		Hail (0.75)	A severe thunderstorm produced ping pong ball sized hail over western Crook County.
Crook	6 W Oshoto	20-Jun-2008			\$20,140		Hail (0.75)	A severe thunderstorm produced large hail over northeastern Campbell and western Crook Counties.
Crook	7 W Aladdin	24-Jun-2008	0	0	\$10,070	\$0	Hail (0.75)	A severe thunderstorm developed over Crook County and produced large hail over the northern Bear Lodge Mountains.
Crook	Moorcroft	17-Jul-2008			\$10,070			A severe thunderstorm produced large hail in the Colony Area.
Crook	1 W Moorcroft	30-May-2009	0	0	\$20,000	\$0	Hail (2.00)	Hail broke windows on the west side of a house.
Crook	2 W Hulett 4 E Hulett Hulett New Haven Colony 4 W New Haven	13-Jul-2009	0	0	\$400,000	\$0	Hail (1.00-4.00)	A supercell thunderstorm developed over northern Campbell County and moved southeastward across Crook County. The storm produced very large hail across western Crook County, which caused significant damage in the New Haven and Hulett area. NCDC recorded this incident as six separate events based on location.
Crook	Moorcroft	19-Jul-2010	0	0	\$800,000	\$0	Hail (2.00)	A severe thunderstorm dropped hail to golf ball size and produced strong wind gusts from Moorcroft to Osage, causing significant damage to buildings and automobiles. Wind-driven large hail broke windows and damaged siding.
Crook	16 NE New Haven New Haven 6 SE Colony 9 NNE Alva 8 NNW Hulett 10 NNE New Haven 15 N Hulett	12-Aug-2010	0	0	\$0	\$0	Hail (1.00-2.00)	A long-lived supercell thunderstorm developed across far northern Campbell County and tracked eastward across northern Crook County and eventually into western South Dakota. Large hail and strong wind gusts damaged automobiles and homes. NCDC recorded this incident as seven separate events based on location.
Crook	Devils Tower	12-Jun-2011	0	0	\$25,000	\$0	Hail (1.00)	A severe thunderstorm produced large hail and wind gusts to 70 mph from Gillette eastward across western Crook County.

Table 8.1 Damaging Hail Storms: 1940-2012

County	Location	Start Date	Deaths	Injured	Estimated Damage-Property	Estimated Damage-Crops	Character of Storm	Information
Crook	Keyhole Reservoir	2-Jul-2011	0	0	\$5,000	\$0	Hail (3.00)	A severe thunderstorm produced large hail around Keyhole Reservoir. Hail from 1.0 to 2.5 inches in diameter fell for 30 minutes and broke windows on a house.
Crook	Moorcroft	27-Jul-2011	0	0	\$100,000	\$0	Hail (2.00)	A severe thunderstorm developed over southwestern Crook County, producing large hail and strong wind gusts.
Crook	Moorcroft Moorcroft	22-Jun-2012	0	0	\$620,000	\$0	Hail (2.75)	A severe thunderstorm tracked southeastward across northern Campbell, southwestern Crook, and northern Weston counties. The storm produced hail to the size of baseballs and gusty winds. The largest hail fell in the Moorcroft area. NCDC recorded this incident as two separate events.
Crook	Sundance Sundance	2-Aug-2012	0	0	\$60,000	\$0	Hail (1.75)	A severe thunderstorm developed over southwestern Crook County and tracked eastward. The storm produced golf ball sized hail from Keyhole Reservoir to Sundance. NCDC recorded this incident as two separate events.

Impacts

Hail storms have occurred in every county in Wyoming. Table 8.2 from the Wyoming Multi-Hazard Mitigation Plan represents dollar damages reported by County from 1926-2010 converted to 2010 USD. Crook County is within the top 10 counties in the State in terms of damaging hail storms. Since the writing of the 2008 Wyoming Multi-Hazard Mitigation Plan, the greatest hail damage occurred in Crook and Sweetwater counties, at \$712,000 and \$700,000 respectively.

Table 8.2 County Rankings by Hail Damage 1926-2010				
County	Damaging Events	Deaths	Injuries	Hail Dollar Damage: 2010 Dollars
Laramie	130	12	76	373,406,023
Natrona	20	0	10	86,513,328
Campbell	40	0	2	59,338,675
Park	22	0	0	41,537,650
Goshen	46	0	0	33,163,726
Big Horn	20	1	1	17,302,765
Sheridan	28	0	0	12,151,946
Crook	24	0	4	10,750,439
Johnson	23	0	2	8,160,069
Fremont	24	0	2	8,318,165
Niobrara	23	0	0	7,593,327
Washakie	19	0	0	7,312,727
Converse	25	0	1	6,975,520
Hot Springs	7	0	1	6,712,331
Weston	17	0	0	4,043,213
Platte	44	0	0	3,536,462
Carbon	4	0	0	2,827,052
Sweetwater	9	0	0	1,216,154
Lincoln	7	0	0	1,006,865
Teton	3	0	2	474,870
Albany	10	0	0	309,262
Sublette	1	0	0	0
Uinta	0	0	0	0
Regional	8	0	0	7,594,609
TOTAL	544	13	101	692,650,569

Future Impacts

Crook County is in a hail prone region of Wyoming and will continue to experience damaging events, based on a recurrence interval of every 2.9 years. Based on the past documented storm damage from the event of record (September 11, 1980) converted to 2012 dollars it is suggested that \$7.7 million, at a minimum, be used as the potential cost

of the worst-case future hail storm in Crook County. Future hail storms will impact private and public property such as cars, roofs, equipment, buildings and agricultural crops and livestock.

Summary

PROPERTY AFFECTED: Medium

POPULATION AFFECTED: Medium

PROBABILITY: High

JURISDICTION AFFECTED: County and all jurisdictions